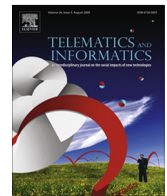




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## Saving lives using social media: Analysis of the role of twitter for personal blood donation requests and dissemination

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### ABSTRACT

Social media has an impact on many aspects of human life ranging from sharing personal information to revolutionizing political systems of entire countries. One not so well studied aspect of social media is analyzing its usage and efficacy in healthcare, particularly in developing countries which lack state-of-the-art healthcare systems and processes. In such countries, social media may be used to facilitate patient-centric healthcare by involving the patient for fulfilling personal healthcare needs. This article provides an in-depth analysis of one such need, that is, how people use social media to request for blood donations. We study the request and dissemination behavior of people using social media to fulfill blood donation requests. We focus on twitter, and blood donation accounts in India. Our study reveals that each of the seven twitter accounts we studied have a large followership of more than 35,000 users on an average and receive a substantial number (more than 900) of donation requests in a day on an average. We analyze the requests in various ways to present an outlook for healthcare providers to make their systems more patient-centric through a better understanding of the needs of people requesting for blood donations. Our study also identifies areas where future social media enabled automated healthcare systems can focus on the needs of individual patients. These systems can provide support for saving more lives by reducing the gap between blood donors and the people in need.

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### 1. Introduction

Twitter, a well-known social network platform, is used for publicly sharing short messages (tweets) of up to 140 characters. Twitter was originally introduced in 2006, and has grown from around 5000 tweets being sent per day in 2007 to about 500 million tweets in 2013 ([internetlivestats.com](http://internetlivestats.com), 2013). With the number of active users averaging 304 million in 2015 ([statista.com](http://statista.com), 2016), twitter offers the opportunity to access a large audience in a very short time. Not only does a tweet from

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a user reach all those users who follow him (followers), the retweet option allows a tweet to be resent by followers, thus spreading the message beyond the recipients of the original tweet.

Due to the tremendous growth of communication technologies during the last decade, use of social networks and mobile technologies is on the rise and they are being used for many different purposes. One such service for which their use may be explored is healthcare. The Internet, and the social networks available on it, have made it possible to direct efforts towards patient-centric healthcare by involving the patients in the healthcare process. An important personal healthcare need is related to blood donations. With more and more people spending time on social media sites, the media may be used to expand blood donation networks. Blood is an essential substance, with an average adult having about 5 liters of it in the body. We witness a huge demand for blood every day all over the world. In developed countries, the demand for blood is on the rise due to advances in surgical procedures. Blood is also required for a large number of patients suffering from certain diseases e.g. cancer or anemia. In developing countries having limited medical facilities, surgical complications may increase the demand for blood. Blood is also needed for accident or burn victims, where blood must be made available quickly. Since blood cannot be manufactured, and there is no substitute for it, finding donors quickly for the timely availability of the requested blood is essential to save precious lives.

According to the World Health Organization (WHO), to meet the requirements for blood, 1% of the population needs to donate blood. Moreover, developing countries have a 15 times lower average donation rate as compared to developed countries. Countries that have well established health systems are generally able to meet the demand for blood, however, blood shortages are common in developing countries (World Health Organization, 2010). Since these countries do not have structured blood donor programs, they are dependent on family, friends or other donors in the general public for blood donations. A patient's family is generally under pressure to find donors quickly, and thus blood donation requests are propagated through different means. Social networks may play an important role not just in disseminating information about the importance of blood donation, but also in the timely propagation of blood donation requests. Twitter and other social media sites are being used for this purpose.

In twitter, typically individual accounts forward blood donation requests of other users. If a person requires a blood donation, he or she mentions the account of the individual in her tweet along with the blood type and contact information. Sometimes individuals directly post a request without a retweet; this could be the case if the individual knows the person who made the request or gets a request from outside twitter (e.g. from Facebook). As shown in Fig. 1, a user is requesting an individual @BloodDonorsIn ("Blood Donors India") for a blood donation of blood group AB+. The individual @BloodDonorsIn forwards this request to its followers through his account as shown in Fig. 2.

In this study, we focus on twitter because data on twitter is publicly available unlike other social media e.g. Facebook where messages may be private. Moreover, due to the length restriction on a twitter message, a Tweet is to-the-point and relatively easy to analyze. Rather than focusing on organization that seek blood donations, we focus on individual twitter accounts because organizations have a systematic way of disseminating information about, and collecting blood donations. As mentioned earlier, they do not usually forward blood donation requests by individuals on social networks. On the other hand, individual accounts work independently, and since they do not have a systematic way of getting blood donations, they rely on appeals to individual donors. Studying and analyzing individual accounts will thus help in better understanding of blood donations requests and donations in countries where there is dependency on the public for donations due to lack of organized blood donor programs.

In this paper, we study the characteristics of blood donation requests on twitter in India. According to [huffingtonpost.in](http://huffingtonpost.in) (2015), India has about 22.2 million twitter users. According to [digitalinsights.in](http://digitalinsights.in) (2014), the number is greater than 30 million, with 75 percent of the users accessing it via their mobiles. Given the fact that the nation requires about 40 million units of blood every year, with only 4 million units being available ([savelifeindia.org](http://savelifeindia.org), 2014), there is a heavy reliance on appeals for blood donations. It is important that these appeals reach donors in time, and social media may be an answer. However, to benefit from social media platforms, we must understand user behavior on these platforms.

We study and analyze the requests received on individual twitter accounts in various ways to view different perspectives and to understand trends. We study, for example, statistics on the most active accounts, and the time for the information to disseminate, and for a request to be fulfilled. We also study the delays involved in the dissemination of requests, and provide statistics for the applications that are used for requests. Our study is useful for:

1. The person appealing for blood donation. By providing, for example, an understanding of which individuals on twitter are more active, or which time may be the best for posting a blood donation request.
2. The blood donor, government, and non-government organizations. By providing, for example, statistics about the number of requests received, the day/month when requests are expected to rise and blood types for which a large number of requests are received.
3. Development of intelligent systems. By identifying areas where automation is possible on twitter, and methods to use for automation.

The analysis of the blood donation network on twitter presented in this paper, and the identified characteristics and trends of the requests may be used to facilitate future planning, especially for patient-centric healthcare, where the trends may be used to understand the behavior of patients and donors to provide personalized services in a timely manner. Although we have found research related to twitter, and separately on blood donation, we found no study similar to ours

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